
Regression Application On The Farmers' Household Consumption Expenditure Model**Diah Retno Dwi Hastuti¹; Rahim Darma^{2*}; Darmawan Salman²; Slamet Santosa³; Rahmadanih²**¹Economics Departement, Faculty of Economics, Universitas Negeri Makassar, Indonesia²Socioeconomic Department, Faculty of Agriculture, Universitas Hasanuddin, Indonesia³Biology Departement, Faculty of Mathematics and Natural Sciences, Universitas Hasanuddin, Indonesia

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Abstract: Every household tries to maximize utility in consuming goods and services with price and income levels as constraints. Household consumption expenditure comes from food and non-food items. Research conducted in Makassar City aims to determine the differences in farmers' household consumption expenditure on food, non-food, and food + non-food and estimate the factors that influence them. The research method used is descriptive and explanatory. They were based on the time dimension, using cross-section data from primary data with a sample of 327 respondents consisting of 165 farmers and 162 female farmers. The findings show that household food expenditure of farmers is smaller than non-food expenditure. The opposite result occurs in the household expenditure of farmers women. Household income, wife's formal education, household size, regional differences, and gender were influence changes in household consumption expenditure from food, non-food, and food + non-food. Increasing household income supported by balanced nutrition education will avoid food insecurity, increasing household expenditure.**Keywords:** household expenditure, food, non-food, farmers and farmer women

INTRODUCTION

Consumption expenditure from each household is related to maximizing utility in consuming goods and services with price and income levels as constraints (Carroll, 2001). Household consumption expenditure is financial planning (Tapsin & Hepsag, 2014), a primary indicator of economic welfare (Moratti & Natali, 2012), as well as the most crucial component of national income and aggregate demand (Bonsu & Muzindutsi, 2017). In general, changes in income (Carroll, 2001; Ofwona, 2013), net income and discount rates, leisure, and wealth or assets (Branson, 1989) were changes in consumption expenditure. Especially age (Manyaja et al., 2018; Ojoko & Umbugadu, 2016), income (Akay & Astar, 2012; Sekhampu & Niyimbanira, 2013), marital status (Manyaja et al., 2018), insurance, ethnicity (Babalola & Isitor, 2014), and household size (Akay & Astar, 2012; Ojoko & Umbugadu, 2016; Sekhampu & Niyimbanira, 2013) can change in household consumption expenditure.

The consumption expenditure household consists of food and non-food carried out by farmers and female farmers in the study area to manage household finances in urban areas. According to Akter et al. (2017), women can be considered a prerequisite for achieving global resilience because they capture cross-cultural variations in needs. The increase in women's contribution is positively related to calorie availability and food diversity at the household level (Sraboni et al., 2014), especially in urban areas. Urban agriculture has an essential role in overcoming urban food insecurity and security (Zezza & Tasciotti, 2010) by providing adequate amounts of food, appropriate nutrition, and cost-effective food supplies (Rezai et al., 2019).

Research on household consumption expenditure has been carried out in various countries, including understanding food-away-from-home (FAFH) consumption in urban China with a fixed effect panel data regression model (Dong & Hu, 2010), decision-making patterns, and home spending. Households of married men and women in Malaysia (Yusuf & Duasa, 2010) and the influence of urban agricultural households on food security status in Ibadan (Yusuf et al., 2015). Likewise, with the expenditure of staple food consumption in Ika (Ndubueze-Ogaraku et al., 2016), the availability of calories and the diversity of agricultural household food in Bangladesh (Sraboni et al., 2014), household food security among urban migrant farmers in Delhi, Jakarta, and Quito (Diehl et al., 2019), as well as food consumption expenditure on cassava plants in Southeast Sulawesi Province (Zani et al., 2019). However, research on household expenditure with food and non-food consumption patterns on farmers and farmer womens has never been carried out.

MATERIALS AND METHODS

This research was conducted in Makassar City, South Sulawesi Province, Indonesia. We used a purposive sampling area in the four largest agricultural producing districts. Furthermore, the selection of respondents using snowball

sampling on 165 farmers and 162 farmer womens. The research method used is descriptive and explanatory. To calculate the distribution of food and non-food consumption expenditures, we use a descriptive approach, while explanatory estimates the factors that influence household expenditure on food and non-food consumption using the Huber-White-Hinkley (HC1) model.

The consumption expenditure function represents the function of household expenditure on food and non-food consumption patterns. The specification of the econometric model of the Keynesian consumption function is a positive relationship between consumption expenditure and income (Gujarati & Porter, 2009) mathematically written as follows:

$$C = \beta_0 + \beta_1 Y \tag{1}$$

where: C is consumption expenditure, β_0 is intercept, β_1 is regression coefficient or model parameter or slope, and Y is income. The value of β_1 illustrates the marginal propensity to consume as a ratio of the rate of change in consumption with income, which we can write as:

$$\beta_1 = MPC = \Delta C / \Delta Y \tag{2}$$

where: MPC is the marginal propensity to consume, ΔC is changes in consumption, and ΔY is the change in income was resulting in changes in consumption.

Furthermore, to describe the uncertainty relationship between economic variables, equation (1) is modified to:

$$C = \beta_0 + \beta_1 Y + \mu \tag{3}$$

where: μ is a confounding factor or error and a random (stochastic) variable with probability properties and characteristics. Based on equation (3), we use it to analyze the estimated factors that influence household expenditure on food and non-food consumption patterns using the multiple regression equation estimation model as follows:

$$ExCF = \beta_0 + \beta_1 H\pi + \beta_2 EdW + \beta_3 QDF + \delta_1 DmSDTmlt + \delta_2 DmSDBrky + \delta_3 DmSDMggl + \delta_4 DmWF + \mu_1 \tag{4}$$

$$ExCnonF = \beta_4 + \beta_5 H\pi + \beta_6 EdW + \beta_7 QDF + \delta_5 DmSDTmlt + \delta_6 DmSDBrky + \delta_7 DmSDMggl + \delta_8 DmWF + \mu_2 \tag{5}$$

$$ExTC = \beta_8 + \beta_9 H\pi + \beta_{10} EdW + \beta_{11} QDF + \delta_9 DmSDTmlt + \delta_{10} DmSDBrky + \delta_{11} DmSDMggl + \delta_{12} DmWF + \mu_3 \tag{6}$$

where: $ExCF$ is household food consumption expenditure, $ExCnonF$ is household non-food consumption expenditure, and $ExTC$ is household food and non-food consumption expenditure. Furthermore, $\beta_0, \beta_4, \beta_8$ are the intercept, $\beta_1, \dots, \beta_3, \beta_5, \dots, \beta_7, \beta_9, \dots, \beta_{11}$ as the independent variable coefficient, and $\delta_1, \dots, \delta_{12}$ are the coefficient of the dummy variable. $H\pi$ is household income, EdW is the formal education of the wife or farmer woman, QDF is household size, $DmSDTmlt$ is the dummy of the Tamalate sub-district, $DmSDBrky$ is the dummy of the Biringkanaya sub-district, $DmSDMggl$ is the dummy of the Manggala sub-district, $DmWF$ is the dummy of farmer women, and μ_1, μ_2, μ_3 are disturbances.

RESULT AND DISCUSSION

Table 1 shows the commodities consumed by farming families ranged from 7.10%-100%. The commodity that is the least consumed is Chinese cabbage in the Biringkanaya sub-district, while those which are consumed entirely by themselves include: cauliflower in the Tamalate sub-district, eggplant in the Manggala sub-district, and spinach and water spinach in the Tamalanrea sub-district. A woman farmer who chooses to consume all of her crops is due to the fulfillment of family nutrition from fresher and healthier vegetables, considering that most of the vegetable supply is imported from outside the Makassar City area. Unlike the case with commodities sold up 92.9% with the largest percentage of mustard commodities in Tamalate sub-district.

Table 1. Amount of farmers' production of food crops and horticulture

Comodity	Tamalate		Biringkanaya		Manggala		Tamalanrea	
	sale (kg)	consume (kg)	sale (kg)	consume (kg)	sale (kg)	consume (kg)	sale (kg)	consume (kg)
Spinach	50.00	5.83	48.21	4.42	37.50	4.82	0	6.25
Water spinach	41.07	6.39	51.25	4.51	49.31	6.18	0	6.02

Chinese cabbage	83.57	8.75	89.42	6.83	62.50	9.29	87.50	8.04
Chilli	1.00	0.60	1.63	0.39	2.15	0.41	2.00	0.57
Eggplant	3.00	0.90	5.00	0.91	0	0.76	4.00	1.08
Tomato	1.50	0.58	1.13	0.39	1.50	0.48	2.50	0.50
Okra	2.00	0.58	1.25	0.43	2.50	0.63	1.50	0.39
Cauliflower	0	1.00	2.25	0.84	2.50	0.85	2.00	1.10
Paddy	130.70	1,908.16	131.82	2,612.50	150.00	4,313.08	132.00	1,300.20

Non-food consumption dominates farmers' household expenditure in Makassar City, ranging from 54.33%-62.63% (Table 2). Meanwhile, the food consumption expenditure was higher for the farmer women group. It is related to a wife's responsibility as a gatekeeper for family consumption towards fulfilling consumption & nutrition (Pólya & Szűcs, 2013). The largest expenditure for the non-food group comes from spending on loan installments, while the smallest expenditure is on the fulfillment of clean water. Meanwhile, in the food group, the smallest expenditure was for other side dishes, including jerky, shredded, canned meat, tempeh, and tofu. The largest expenditure was meat, beef, poultry, seafood, smoked fish, and salted fish (figure 1).

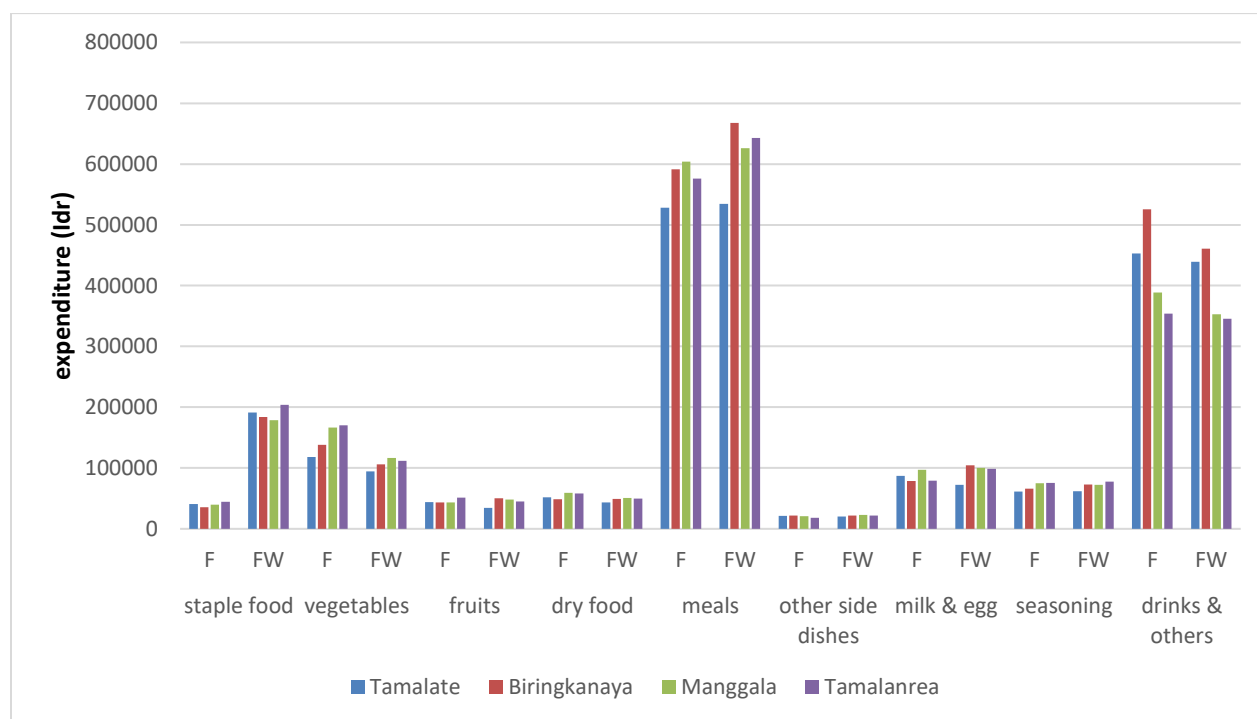


Figure 1. Food consumption expenditure

The participation of farmers in fulfilling food in urban areas is needed to meet food sufficiency (Abokyi et al., 2020; Yusuf et al., 2015). For example, the participation of urban migrant farmers in Delhi, Jakarta, and Quito has a positive impact on household food security, both directly (self-consumption) and indirectly (increased income, increased access) (Diehl et al., 2019). Households engaged in agricultural activities tend to consume more fruits and vegetables, have a more diverse diet (Diehl et al., 2019) and fresh (Benis & Ferrão, 2018; DiDomenica & Gordon, 2016). Meanwhile, Babalola & Isitor (2014) found in Nigeria that 60% of household income is spent on food even though it is expensive. Households in Southeast Sulawesi spend more money on food (89.84%) than non-food (10.16%), and food expenditure is dominated by starchy staples, fish and eggs, while consumption of vegetables, fruit, and low milk (Zani et al., 2019). Furthermore, it was explained that most households that grow cassava have a low level of welfare, and their food consumption is not diverse and of good quality. So socio-economic factors

significantly affect household food expenditure for specific food groups such as staple foods, animal food, fruit, vegetables, nuts, and others (Ramdhanie et al., 2017).

Table 2: Distribution of agricultural household expenditure on food and non-food consumption in Makassar City, Indonesia

Sub-district	Consumption expenditure				Total (IDR)	
	Food		Non-Food			
	Average (IDR)	Percentage (%)	Average (IDR)	Percentage (%)		
Tamalate						
	Farmer	1,375,342	38.97	2,153,456	61.03	3,528,798
	Farmer women	1,481,762	41.57	2,082,381	58.43	3,564,143
Biringkanaya						
	Farmer	1,525,295	44.37	1,911,932	55.63	3,437,227
	Farmer women	1,709,857	45.67	2,033,696	54.33	3,743,553
Manggala						
	Farmer	1,458,808	40.96	2,102,872	59.04	3,561,680
	Farmer women	1,553,112	44.49	1,937,592	55.51	3,490,704
Tamalanrea						
	Farmer	1,395,020	37.37	2,338,360	62.63	3,733,380
	Farmer women	1,585,694	42.11	2,179,667	57.89	3,765,361

Household expenditure on food, non-food, and food + non-food consumption in Makassar City is positively influenced by household income at an error rate of 1% (Table 3). It means that any increase in household income will increase household consumption expenditure. Food consumption is very much influenced by income as a crucial social-economic factor, as is the case in urban China. Its income elasticity is used as an indicator in demand for food-away-from-home (FAFH) (Dong & Hu, 2010). Likewise, what happened in Nigeria was that household income positively affected food expenditure (Babalola & Isitor, 2014; Babatunde et al., 2019) because food was the preferred staple consumption (Ndubueze-Ogaraku et al., 2016).

Formal education also positively affects food expenditure, non-food, and food + non-food consumption at the 99% confidence level. This finding is in line with the results of Zani *et al.* (2019) in Southeast Sulawesi. The wife or farmer woman's education in the household greatly determines household expenses (Rahim and Hastuti, 2018) in managing finances. It can be seen from the food consumption, which is greater than farmers in all sub-districts in the study area, namely 41%-45%, while farmers are 37%-44% (Table 2). This education serves as an investment that benefits the family's economic welfare (Rabearisoa & Zorzi, 2013) through spending arrangements and creating additional income outside of the husband's income.

Household size does not significantly affect food consumption. Still, it is significant for non-food and food + non-food consumption at an error rate of 10% and 5%, respectively. This finding is not in line with household size, which positively affects Nigeria's household food consumption expenditure (Ndubueze-Ogaraku et al., 2016). However, non-food expenditure is under the findings of Utami and Ayu (2018). According to Rahim et al. (2019), family members are the head of the family responsibility, encouraging workers to increase income and affect household expenses.

The difference in the residential area on the food, non-food, and food + non-food consumption patterns of Tamalate sub-district has no significant effect. However, Biringkanaya and Manggala sub-districts have a significant impact on the error rate of 1%. The exciting thing that happened was that in the Biringkanaya sub-district, the food consumption pattern was higher than in other sub-districts, but not in the non-food group. The results of these predictions are under empirical data that the highest food consumption expenditure pattern is IDR 1.71 million (farmer women) and IDR 1.52 million (farmers) in Biringkanaya sub-district and the lowest in Tamalate sub-district IDR 1.48 million (female farmers) and IDR 1.37 million (farmers). On the other hand, the highest non-food expenditure was IDR 2.34 million (farmers) and IDR 2.18 million (farmer women), and the lowest was IDR 1.91 million (farmers) and IDR 1.94 million (farmer women). The high and low expenditure of food and non-food consumption is caused by household income from production and farm income during the harvest season and production consumed.

Table 3. Analysis of factors affecting household consumption expenditure of farmers using the Huber-White-Hinkley (HC1) model

Independent variable	Food		Non-food		Food+non-food	
	β_i	t-test	β_i	t-test	β_i	t-test
Household income	0.187***	11.911	0.360***	17.564	0.548***	18.390
Education formal	266 823.9***	3.919	266 542.4***	2.787	533 366.3***	4.040
Household size	-110 437.9 ^{ns}	-0.728	-401 007.5*	-1.877	-511 445.4*	-1.818
Dummy Tamalate	-25 896.71 ^{ns}	-0.046	-596 045.1 ^{ns}	-0.612	-621 941.8 ^{ns}	-0.513
Dummy Biringkanaya	444 212.7 ^{ns}	0.937	-5 303 898.0***	-6.457	-4 859 685***	-4.884
Dummy Manggala	-2 528 657.0***	-5.117	-8 020 945.0***	-8.821	-10 549 602***	-9.451
Dummy of farmer women	6 904 196.0***	12.177	9 827 284.0***	12.189	16 731 480***	15.907
Intercept	2 070 404.0	1.790	1 488 375.0	0.882	3 558 779.0	1.575
Adjusted R ²		0.511		0.581		0.663
F-test		49.624		65.652		92.736
n		327		327		327

*** is a level error significance of 1%, ** is a level error significance of %, * is a level error significance of 10%, and ^{ns} is not significance

According to Rahim et al. (2018), one of the causes of household consumption expenditure changes is changes in production and business income. The existence of agricultural households in urban areas will positively impact food security (Yusuf et al., 2015).

Gender differences (female farmers) significantly affect household expenditure, meaning that female farmers' household consumption expenditure is higher than farmers'. These results have been consistent with empirically that non-food and food + non-food is higher than food, but the non-food consumption of female farmers is smaller than farmers (Table 1). Regarding gender, women are often the final decision-makers regarding daily household expenditures, including food. Simultaneously, men make the final decisions about spending more on their household, but men and women exercise autonomy in Malaysia (Yusof & Duasa, 2010). Gender plays a dominant role in food insecurity. That is, if women are the head of the family, there is food insecurity. In contrast, if men are the head of the family, there is food security in Pakistan (Abdullah et al., 2019).

CONCLUSION

Farmers' household food consumption expenditure in Makassar City is smaller than non-food consumption. Meanwhile, the pattern of household food consumption expenditure of female farmers is greater than that of farmers. However, farmer women's non-food consumption expenditure is smaller than farmers'. Changes in household expenditure are positively and significantly influenced by household income, wife's formal education, and gender. Then negatively by household size and the differences in the area of residence.

Through counseling on balanced nutrition education, wife education is healthier and works actively by finding cheaper alternative sources of protein to avoid food insecurity. Also, safeguarding areas with potential in the agricultural sector will reduce food consumption expenditure.

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